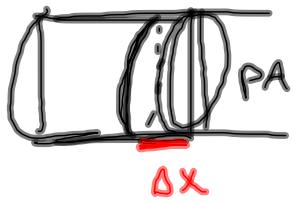
12.



$\int_{(P_1,V_1)}^{(P_2,V_2)} P\,dV$

a) $\Delta W = PA\,\Delta x$

$= P\,\Delta V$

$\leq P\Delta V$

$\therefore$

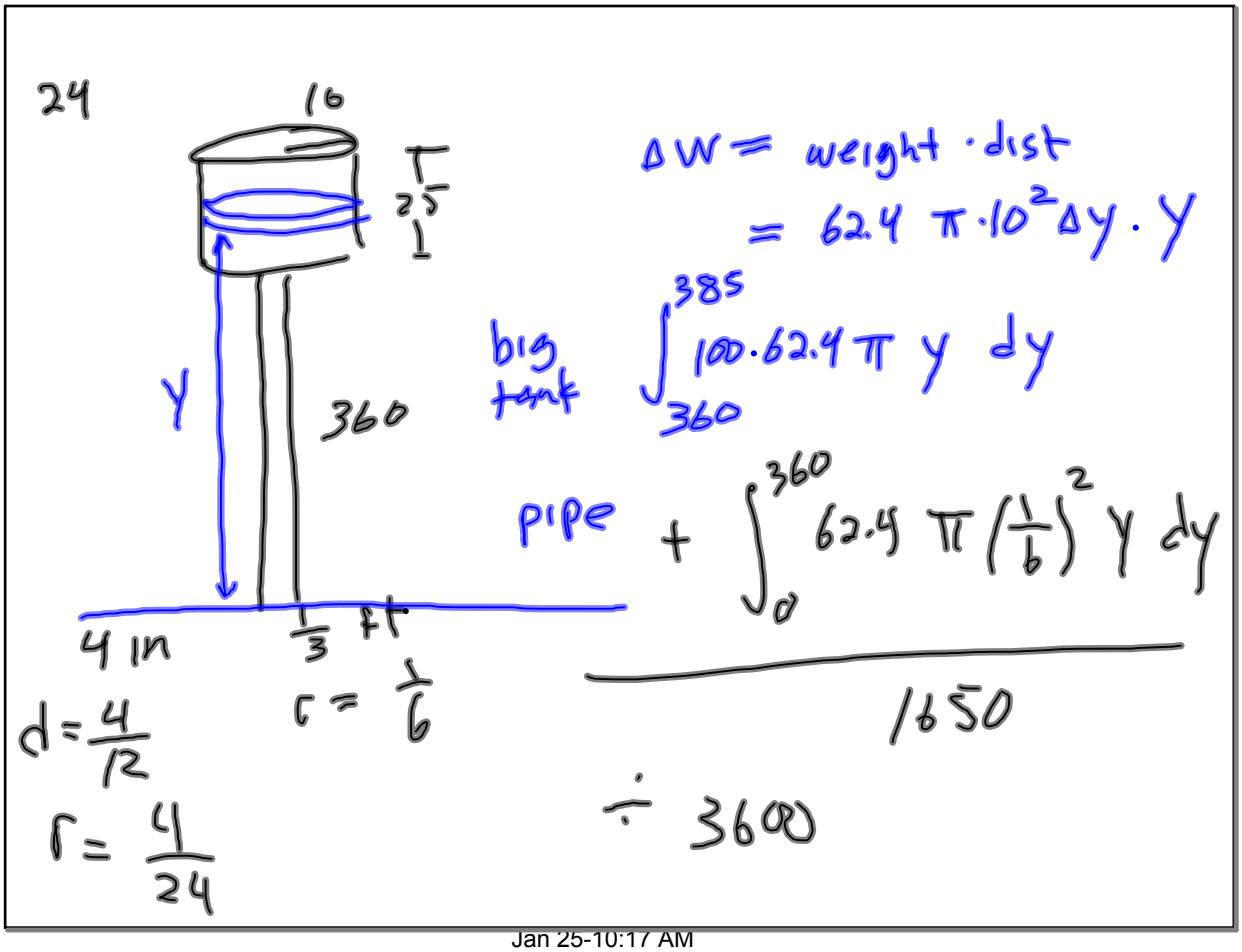
$PV^{1.4} = k$

$P = \frac{k}{V^{1.4}}$

$k = 50 \cdot 243^{1.4}$

$\int_{243}^{32} \frac{50 \cdot 243^{1.4}}{V^{1.4}}\,dV$

Jan 25-9:31 AM



ΔW = weight · dist

$= 62.4\,\pi \cdot 10^2 \Delta y \cdot y$

big tank $\int_{360}^{385} 100 \cdot 62.4\,\pi\,y\,dy$

pipe $+ \int_{0}^{360} 62.4\,\pi \left(\frac{1}{6}\right)^2 y\,dy$

1650

$\div 3600$

Jan 25-10:17 AM

7.5 b hydrostatic force (fluid force)

p = pressure

y, h = depth

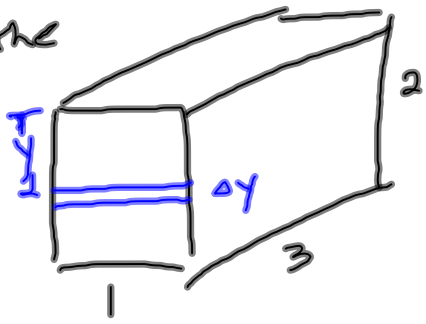
$p = w\,h$

w = weight density (constant)

62.4 for water

Force = $p\,A$ if p constant

Find the Force

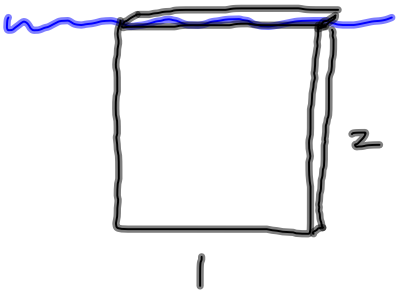


$\Delta F = w\,y\,\Delta A$

$= w\,y\,1\cdot\Delta y$

$F = \int_0^2 62.4\,y\,dy$

Jan 25-10:28 AM

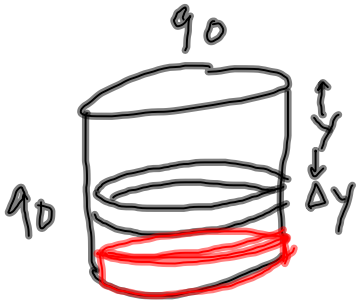


submerge.

same approach

F = 124.8 on front & back

Jan 25-10:41 AM



$$\int_0^{90} 100\, y\, 2\pi\, 45\, dy$$

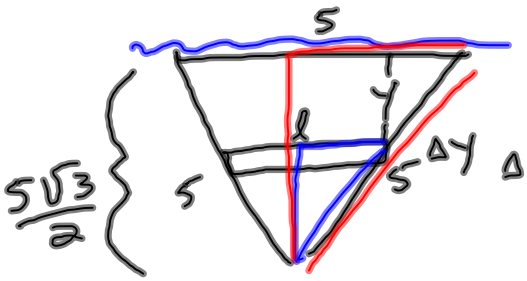
total 1.145×10^8 lb

force on 1 ft band around bottom

$$\Delta F = p\,\Delta A$$
$$= w \cdot h\, \Delta A$$
$$= w \cdot y\, 2\pi r\, \Delta y$$

$$\int_{89}^{90} 100\, y\, 2\pi\, 45\, dy$$

Jan 25-10:44 AM



$w = 64$

$$\Delta F = p\,\Delta A$$
$$= w \cdot h\, \Delta A$$
$$= 64\, y\, \Delta A$$

$$\Delta A = \ell\, \Delta y$$

↑ varies

$$\frac{2.5}{2.5\sqrt{3}} = \frac{1}{\sqrt{3}} = \frac{\ell/2}{5\sqrt{3}/2 - y}$$

$$\ell = \frac{2}{\sqrt{3}}\left(5\sqrt{3} - y\right)$$

$$\int_0^{5\sqrt{3}} 64\, y \left(\frac{2}{\sqrt{3}}\left(5\sqrt{3} - y\right)\right)$$

Jan 25-10:53 AM